Propositions

Belonging to Thesis

Convergence Analysis and Control of Evolutionary Matrix Games

1. When you interact with others through repeated two-player snowdrift games, unconditional cooperation can help you to outperform others in the long run, even when your opponents defect and easily take advantage of you [Ch. 4].

2. In a population consisting of groups of individuals who cooperate only with their own group-mates, just one group survives in the long run, whereas in a population consisting of groups of individuals who cooperate with everyone but their own group-mates, all groups survive in the long run and their population shares are equalized [Ch. 5].

3. It is not necessarily true that a coach or psychologist is underperforming if he/she is unable to promote the cooperation level of a group of interacting individuals; it may be simply that the level-off phenomenon is taking place [Ch. 6].

4. In well-mixed populations of individuals who cooperate only if enough others also cooperate, there is a benchmark type of individuals such that eventually all individuals who are more (less) cooperative than the benchmark will cooperate (defect). The same holds when the individuals cooperate only if less than enough others cooperate [Ch. 6 & 7].

5. Given a well-mixed population of coordinating individuals, clean-cut equilibrium states (where individuals with the same cooperation tendency either all cooperate or all defect) are likely to be stable; other equilibria, if there is any, are always unstable [Ch. 7].

6. A network of all coordinating or all anti-coordinating individuals always reaches an equilibrium strategy state, regardless of how they are connected, how different their preferences are, and how many

simultaneous decisions are made over time (as long as random single decisions are not completely excluded) [Ch. 8].

7. A near-optimal algorithm for budgeted targeted incentive control of networks governed by the imitation or best-response update rule is IPRO (that is to iteratively select the agent who, upon switching strategies, maximizes the ratio between the resulting change in potential and the cost of achieving such a switch, until desired convergence is achieved) [Ch. 9 & 11].

8. Imitating successful neighbors hinders reaching satisfactory decisions [Ch. 10].

9. Unconditional cooperation (ALLC) can indeed outperform all reactive strategies including tit-for-tat and even the zero-determinant strategies when you play against your supervisor.